

Amendments to the Claims:

Rewrite the claims as set forth below. This listing of claims replaces all prior versions and listings of claims in the application:

1. (currently amended) An adaptive supply voltage and body bias apparatus comprising:

a master controller operatively responsive to an operation state value;

a dynamic voltage supplier operably coupled to the master controller, the dynamic voltage supplier operative to receive a supply voltage indicator from the master controller;

an adaptive body biaser operably coupled to the master controller, the adaptive body biaser operative to receive a body bias indicator from the master controller; and

a plurality of computing devices, each of the computing devices having ~~[[a respective]]~~ different ones of a plurality of different threshold voltages, each of the plurality of computing devices being operative to receive a supply voltage from the dynamic voltage supplier and the plurality of computing devices being operative to receive at least one body bias voltage from the adaptive body biaser;

wherein the master controller further generates a second supply voltage indicator and a second body bias indicator based on a difference between optimized performance and actual performance of the plurality of computing devices, the master controller operative to provide the second supply voltage indicator to the dynamic voltage supplier and operative to provide the second body bias indicator to the adaptive body bias circuit.

2. (canceled)

3. (previously presented) The adaptive supply voltage and body bias apparatus of claim 1 wherein the frequency monitor generates a frequency offset value.

4. (original) The adaptive supply voltage and body bias apparatus of claim 3 wherein the frequency offset value is based on a comparison of the output frequency indicator and a reference frequency indicator.

5. (original) The adaptive supply voltage and body bias apparatus of claim 3 wherein the frequency offset value is provided to the master controller, the master controller generating a second supply voltage indicator and a second body bias indicator in response to the frequency offset value and the operation state value, the master controller operative to provide the second supply voltage indicator to the dynamic voltage supplier and operative to provide the second body bias indicator to the adaptive body bias circuit.

6. (previously presented) The adaptive supply voltage and body bias apparatus of claim 5 wherein:

each of the plurality of computing devices is operative to receive a second supply voltage from the dynamic voltage supplier and wherein the plurality of computing devices is operative to receive at least a second bias voltage from the adaptive body biasee.

7. (original) The adaptive supply voltage and body bias apparatus of claim 1 wherein the master controller receives the operation state value from a processing device.

8. (original) The adaptive supply voltage and body bias apparatus of claim 1 wherein the plurality of computing devices are disposed on a processing element.

9. (original) The adaptive supply voltage and body bias apparatus of claim 1 wherein the supply voltage indicator and the body bias indicator are voltages.

10. (currently amended) A method for providing an adaptive supply voltage and body bias voltage, the method comprising:

generating a supply voltage indicator and a body bias indicator in response to an operation state value;

generating a supply voltage in response to the supply voltage indicator;

generating at least one body bias voltage in response to the body bias indicator;

providing the supply voltage to each of a plurality of computing devices, each of the computing devices having ~~[[a respective]]~~ different ones of a plurality of different threshold voltages, and providing the at least one body bias voltage to the plurality of computing devices;

generating an output frequency indicator from at least one of the plurality of computing devices;

providing the output frequency indicator to a frequency monitor; and

generating, by the frequency monitor, a frequency offset value based on the output frequency indicator and a reference frequency.

11. (canceled)

12. (previously presented) The method of claim 10 further comprising:

providing the frequency offset value to a master controller.

generating a second supply voltage indicator and a second body bias indicator in response to the frequency offset value and the operation state value; and

providing the second supply voltage indicator to a dynamic voltage supplier and the second body bias indicator to an adaptive body biasee.

13. (previously presented) The method of claim 12 further comprising:

generating a second supply voltage;

generating at least a second body bias voltage; and

providing the second supply voltage to each of the plurality of computing devices and providing at least the second body bias voltage to the plurality of computing devices.

14. (original) The method of claim 10 further comprising:

receiving the operation state value from a processing device.

15. (original) The method of claim 10 wherein the plurality of computing devices are disposed on a processing element.

16. (currently amended) An adaptive supply voltage and body bias apparatus comprising:

a master controller operative to receive an operation state value, the master controller operative to generate a supply voltage indicator and a body bias indicator based on the operation state value;

a dynamic voltage supplier operably coupled to the master controller, the dynamic voltage supplier operative to receive the supply voltage indicator;

an adaptive body biasee operably coupled to the master controller, the adaptive body biasee operative to receive the body bias indicator;

a plurality of computing devices, each of the computing devices having different ones of a plurality of threshold voltages, the plurality of computing devices operative to receive a supply voltage from the dynamic voltage supplier and a bias voltage from the adaptive body biase;

a frequency monitor operably coupled to the plurality of computing devices, the frequency monitor operative to receive an output frequency indicator from at least one of the plurality of computing devices.

17. (original) The adaptive supply voltage and body bias apparatus of claim 16 wherein the frequency monitor generates a frequency offset value based on a comparison of the output frequency indicator and a reference frequency indicator.

18. (original) The adaptive supply voltage and body bias apparatus of claim 17 wherein the frequency offset value is provided to the master controller, the master controller generating a second supply voltage indicator and a second body bias indicator in response to the frequency offset value and the operation state value, the master controller operative to provide the second supply voltage indicator to the dynamic voltage supplier and operative to provide the second body bias indicator to the adaptive body bias circuit.

19. (previously presented) The adaptive supply voltage and body bias apparatus of claim 18 further comprising:

the plurality of computing devices operative to receive a second supply voltage from the dynamic voltage supplier and a second body bias voltage from the adaptive body biase.

20. (currently amended) A method for tuning a supply voltage and a body bias for a processing device, the method comprising:

for ~~[[a first]]~~ each sub-section of a plurality of sub-sections of the processing device,
wherein each sub-section includes a plurality of computing devices having a different one of a
plurality of threshold voltages relative to the other sub-sections;

(a) generating a supply voltage indicator and a body bias indicator in response to
an operation state value;

(b) generating a supply voltage in response to the supply voltage indicator;

(c) generating a body bias voltage in response to the body bias indicator;

(d) providing the supply voltage and the body bias voltage to a plurality of
computing devices, each of the computing devices having one of a plurality of threshold
voltages;

(e) generating an output frequency indicator with at least one of the plurality of
computing devices;

(f) generating a frequency offset value based on the output frequency indicator
and a reference frequency indicator; and

(g) updating the supply voltage and the body bias voltage in response to the
frequency offset value and the operation state value.

21. (canceled)

22. (currently amended) The method of claim 20 ~~[[21]]~~ further comprising:
repeating steps (a) through (g) for each of a plurality of sub-sections of the processing
device.

23. (original) The method of claim 22 wherein the operating state value may be one
of a plurality of values for each of the sub-sections.

24. (currently amended) An adaptive supply voltage and body bias apparatus comprising:

a dynamic voltage supplier operative to receive a supply voltage indicator;
an adaptive body biaser operative to receive a body bias indicator; and
a plurality of computing devices, each of the computing devices having ~~[[a respective]]~~
different ones of a plurality of different threshold voltages, each of the plurality of computing devices operative to receive a supply voltage from the dynamic voltage supplier and the plurality of computing devices being operative to receive at least one body bias voltage from the adaptive body biaser;

wherein the plurality of computing devices comprise a first computing device and a second computing device, wherein each of the first computing device and the second computing device comprises at least two transistor devices operatively coupled in a push-pull configuration, and wherein an output of the first computing device is operatively coupled to an input of the second computing device.

25. (canceled)